WHAT IS CLAIMED IS:

1. A storage device comprising:

an electron emitter;

a storage medium comprising an information layer having at least a first state and a second state for storing information; and

a resistance measurement system coupled to the storage medium for reading the information stored at the information layer by measuring resistance to determine a state of a storage area on the information layer.

2. The storage device of claim 1, further comprising a micromover to change a relative position between the electron emitter and the storage medium.

3. The storage device of claim 1, wherein a read signal path is defined between the electron emitter and a storage medium reference, and the resistance measurement system detects a first resistance by measuring the resistance through the storage medium including the storage area along the read signal path.

4. The storage device of claim 3, wherein the resistance measurement system includes a voltage divider that utilizes the first resistance and a second, known resistance.

5. The storage device of claim 3, wherein the first resistor has a value representative of whether the read signal path passes through a portion of the information layer that is in the first state or the second state.

6. The storage device of claim 3, wherein the resistance measurement system receives a current output signal representative of whether the read signal path passes through a portion of the information layer in the first state or the second state.

7. The storage device of claim 6, wherein the resistance measurement system further comprises a transimpedance amplifier for converting the current output signal to a voltage signal representative of the first state or the second state.

8. A storage device comprising:

an electron emitter capable of generating an electron beam current;

a storage medium, comprising an information layer and a semiconductor layer, the information layer having a first state and a second state for storing information; and

a resistance measurement system coupled to the storage medium, wherein when the storage medium is exposed to the electron beam current along a signal path, the resistance measurement system detects a resistance value representative of whether the information layer is in the first state or the second state along the signal path.

9. The storage device of claim 8, wherein the information layer is made of a phase change material.

10. The storage device of claim 9, wherein the phase change material is a Ge-Sb-Te ternary alloy.

11. The storage device of claim 8, wherein the first state is a crystalline state and the second state is an amorphous state.

12. The storage device of claim 8, wherein the semiconductor layer comprises silicon.

13. The storage device of claim 8, wherein the semiconductor layer comprises metal.

14. A storage system comprising:

a nonvolatile storage device comprising an electron emitter that generates an electron beam current, a storage medium in close proximity to the electron emitter, wherein the storage medium comprises an information layer made of a phase change material and a semiconductor layer, and a resistance measurement system coupled to the storage medium, wherein as the storage medium is exposed to the electron beam current along a signal path, the resistance measurement system detects a resistance value representative of whether the information layer is in a first state or a second state; and

a control system in communication with the resistance measurement system for reading data at the information layer.

15. The storage system of claim 14, the storage system having a read mode, where in the read mode the control system controls the magnitude of the power density of the electron beam current generated from the electron emitter that provides a resistance detection signal representative of the information stored on the storage medium.

16. The storage system of claim 15, the storage system having a write mode, where in the write mode the control system operates to control the magnitude of the power density of the electron beam current generated from the electron emitter to change a storage location on the storage medium between the first state and the second state to store information at the storage location.

17. The storage system of claim 16, where in the read mode the magnitude of the power density of the electron beam current is less than the magnitude of the power density of the electron beam current in the write mode.

18. The storage system of claim 14, wherein at least a portion of the control system is located on the same semiconductor chip as the nonvolatile storage device.

19. A storage system comprising:

a control system; and

an array of storage devices in communication with the storage system, each storage device including an array of electron emitters fabricated by semiconductor microfabrication techniques capable of generating electron beams, a storage medium having medium partitions, and a plurality of micromovers wherein each micromover is operable to move one or more media partitions relative to one or more electron emitters for reading and writing data at the media, and a resistance measurement system positioned at each media partition for reading data stored at the media partition.

20. The system of claim 19, wherein at least a portion of the control system and the array of storage devices are located on the same semiconductor chip.

21. The system of claim 19, wherein the control system receives an output signal from each resistance measurement system representative of data stored at each media partition.